



## UNITED STATES DEPARTMENT OF COMMERCE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/147,721 02/24/97 CHANEY

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HM12/0222

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

## Office Action Summary

Application No.  
09/147,721

Applicant(s)

Chaney et al

Examiner

Medina A. Ibrahim

Group Art Unit

1638



Responsive to communication(s) filed on Feb 24, 1999

This action is **FINAL**.

Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle* 35 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

### Disposition of Claim

- Claim(s) 1-11 is/are pending in the application.
- Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- Claim(s) \_\_\_\_\_ is/are allowed.
- Claim(s) 1-11 is/are rejected.
- Claim(s) \_\_\_\_\_ is/are objected to.
- Claims \_\_\_\_\_ are subject to restriction or election requirement.

### Application Papers

- See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- The proposed drawing correction, filed on \_\_\_\_\_ is  approved  disapproved.
- The specification is objected to by the Examiner.
- The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. § 119

- Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- All  Some\*  None of the CERTIFIED copies of the priority documents have been received.
- received in Application No. (Series Code/Serial Number) \_\_\_\_\_.
- received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- \*Certified copies not received: \_\_\_\_\_
- Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

### Attachment(s)

- Notice of References Cited, PTO-892
- Information Disclosure Statement(s), PTO-1449, Paper No(s). 3
- Interview Summary, PTO-413
- Notice of Draftsperson's Patent Drawing Review, PTO-948
- Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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### **DETAILED ACTION**

The Group and/or Art Unit location of your application in the PTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Group Art Unit 1638.

#### ***Errors***

This application should be reviewed for errors. Errors appear, for example, in page 9, last sentence, where " int eh" should be ---in the---; in claim 11, where " Allysum" should be ---Alyssum---.

#### ***Double Patenting***

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321© may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground

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provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1-11 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-5 of U.S. Patent No. 5,711,784. Although the conflicting claims are not identical, they are not patentably distinct from each other because they are both drawn to the phytomining of nickel with Alyssum species. Therefore, the subject matter instantly claimed which is a method of recovering nickel from serpentine soil by growing selected Alyssum species in said soil conditioned with soil pH below about 7, Ca concentration about 0.128 mM-5mM , Ca/Mg exchangeable ratio about 0.16-0.40, and chelating agents with Fe, Mg, and ammonium based N-fertilizer , wherein said plant has a concentration of 2.5%-5% recoverable nickel in its above-ground tissue (based on dry weight), would have been obvious over the subject matter claimed, a method of recovering nickel from soil containing nickel under conditions sufficient for selected Alyssum species to accumulate at least 2.5% ( dry wt) recoverable nickel in its above ground tissue by maintaining soil pH of 4.5-6.2, an exchangeable calcium concentration at 20% lower than the exchangeable Mg concentration, and adding ammonium-containing fertilizer and chelating agents, in the patent.

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Claims 1-11 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-5 of U.S. Patent No. 5,944,872. Although the conflicting claims are not identical, they are not patentably distinct from each other because they are both drawn to the phytomining of nickel with Alyssum species. Therefore, the subject matter instantly claimed which is a method of recovering nickel from serpentine soil by growing selected Alyssum species in said soil conditioned with soil pH below about 7, Ca concentration about 0.128 mM-5mM , Ca/Mg exchangeable ratio about 0.16-0.40, and chelating agents with Fe, Mg, and ammonium based N-fertilizer , wherein said plant has a concentration of 2.5%-5% recoverable nickel in its above-ground tissue (based on dry weight), would have been obvious over the subject matter claimed, a method of recovering nickel from soil containing nickel under conditions sufficient for selected Alyssum species to accumulate at least 2.5% ( dry wt) recoverable nickel in its above ground tissue by maintaining soil pH of 4.5-6.2, an exchangeable calcium concentration at 20% lower than the exchangeable Mg concentration, and adding ammonium-containing fertilizer and chelating agents, in the patent.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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4. Claims 1-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is vague and indefinite for failing to clearly recite the essential method steps. It is unclear if more than one step is included in the claimed method. One suggestion is to insert ---a.-- at the beginning of line 2 ; ---b.--- at the beginning of line 6 and replace “Allowing” with ---allowing----; ---c.--- at the beginning of line 9; and ---d.-- in line 10. Dependent claims 2-11 are included in the rejection.

***Claim Rejections - 35 USC § 101***

5. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claim 11 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claim is directed to a naturally occurring plant and therefore does not constitute patentable subject matter. See *American wood v. Fiber Distintegrating Co.*, 90 U.S. 566 (1974), *American Fruit Growers v. Brogdex Co.*, 283 U.S. 2(1931), *Funk Brothers Seed Co. V. Kalo Inoculant Co.*, 33 U.S. 127 (1984), *Diamond v. Chakrabarty*, 206 USPQ 193 (1980).

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***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claim 11 is rejected under 35 U.S.C. 102(b) as being anticipated by Brooks et al (Vegetation, 1981).

The claim is directed to a naturally occurring Alyssum plant which has 2.5-5% ( dry wt)of nickel in its above ground tissue.

Brooks et al teach the naturally occurring Alyssum bertolonii Desv. with a concentration of 10% of nickel in its dried leaves ( see, e.g., page 183, paragraph bridging the columns).

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to

the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raskin et al (US 5,787,735, filed June, 1994) in view of Brooks et al (Vegetation, 1981).

The claims are drawn to a method of recovering nickel from a serpentine soil by growing a nickel hyperaccumulating plant, from the wild-type species of the genus of Alyssum, on said soil until the concentration of Ni in the above ground tissue is at least 2.5%-5% of gross dry weight (above ground tissue) while maintaining calcium concentration in the soil from about 0.128mM to about 5mM, soil pH below 7, exchangeable Ca/Mg ratio about 0.16-0.40, and in the presence of chelating agents with Fe, Mg and ammonium based N-fertilizer.

Raskin et al teach a method of removing an amount of metal including nickel ( see, e.g., columns 1-2) from metal contaminated soil such as serpentine soil by growing at least one metal hyperaccumulating plant from Brassicaceae including the genera Alyssum on said soil ( see, columns 3-6) with soil conditioned by maintaining a soil pH 5.8-6.2, adding an effective amount of metal chelating agents such as CaNO<sub>3</sub> to increase metal availability to plants ( see, e.g., columns 6 -7), adding an ammonium containing fertilizer ( see, e.g., column 9, 2nd full paragraph), and have shown that lead (Pb) accumulation ability of the Brassicaceae plant was as high as 10 times more metal in the shoots on a dry weight basis than the lead present in the lead-

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contaminated soil (see, e.g., column 10). In column 2, lines 19-20, the reference teaches that Ni, Cr, Cd, and Zn have been accumulated by these methods.

Raskin et al do not teach the specific soil conditions required for Ni accumulation by Alyssum species.

Brooks et al teach three *Alyssum serpyllifolium* subspecies ( *ssp.serpyllifolium* , *ssp. lusitanicum* and *ssp.malacitanum*) which are serpentine endemic and Ni hyperaccumulators, their Ni uptake at varying concentration levels of calcium, magnesium, or Ca/Mg ratio, and confirmed a significant association between low Ca/Mg ratio and Ni uptake in these subspecies (see, e.g., Abstract). In one of the trials to measure nickel uptake, *ssp.malacitanum* accumulated over 2.0% ( 20,000 ug/g) of nickel in its dried leaves when grown on a soil nickel content of 1000ug/g ( see, e.g., paragraph bridging pages 186 and 187).

It would have been obvious to one with ordinary skill in the art at the time the invention was made to utilize the method of phytorecovering heavy metals from serpentine and non-serpentine soils taught by Raskin et al, and to modify that method by incorporating the specific soil conditions for phytomining of nickel with Alyssum species as taught by Brooks et al , given the knowledge of one of ordinary skill in the art the importance of Mg , Ca and other soil micro nutrients in the phytorecovery of nickel as taught by Brooks et al, to develop optimum ranges of soil conditions for high recovery of nickel as taught by Brooks et al. The choice of specific Alyssum species or specific chelating agents would have been an optimization of process parameters.

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Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chaney et al (US 5,711,784, filed June, 1995).

The claims are drawn to a method of recovering nickel from a serpentine soil by growing a nickel hyperaccumulating plant, from the wild-type species of the genus of *Alyssum*, on said soil until the concentration of Ni in the above ground tissue is at least 2.5%-5% of gross dry weight (above ground tissue) while maintaining calcium concentration in the soil from about 0.128mM to about 5mM , soil pH below 7, exchangeable Ca/Mg ratio about 0.16-0.40, and in the presence of chelating agents with Fe, Mg and ammonium based N-fertilizer.

Chaney et al teach a method of recovering nickel from soil containing nickel under conditions sufficient for selected *Alyssum* species to accumulate at least 2.5-5% ( dry wt) recoverable nickel in its above ground tissue by maintaining soil pH of 4.5-6.2, an exchangeable calcium concentration at 20% lower than the exchangeable Mg concentration, and adding ammonium-containing fertilizer and chelating agents ( see, whole document).

Chaney et al do not teach specific Ca concentration or specific Ca/Mg ratio.

It would have been obvious to one with ordinary skill in the art at the time the invention was made to utilize the method of phytomining nickel from nickel rich soils using *Alyssum* species as taught by Chaney et al, and to modify that method by incorporating the specific soil conditions for phytomining of nickel with specific *Alyssum* species as taught by Chaney et al, to develop optimum ranges of soil conditions for high recovery of nickel as taught by Chaney et al. The

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choice of specific concentration of Ca or Ca/Mg ratio would have been an optimization of process parameters.

No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Medina A. Ibrahim whose telephone number is (703) 306-5822. The examiner can normally be reached on Monday through Friday from 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynette Smith, can be reached on (703) 308-3909. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-7401.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0196.

February 17, 2000

mai

Medina A. Ibrahim  
PRINCIPAL EXAMINER  
ART UNIT 1638

Dated 2/28